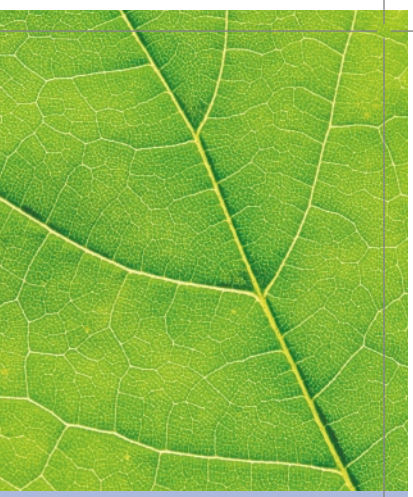
Green Packaging

ACTEL'S COMMITMENT TO THE ENVIRONMENT

Key Features

- Actel Offers a Progressive and Industry-Leading Green Program
- All Plastic Packages Offered as Lead-Free
- All Plastic Leaded Packages Offered as Halogen-Free
- RoHS Compliant
- Corporate Recycling Program

A growing concern with governments, companies, and individuals is the use of hazardous substances in electronic equipment. The use of these substances contaminates landfills, poses potential health risks, and harms the environment. There are several directives established by the European Parliament that have proposed regulations restricting the use of hazardous substances in electronic products. In addition, manufacturers of electronic systems and components from around the world are voluntarily reducing the use of these materials in their products.



Actel is committed to improving conservation of natural resources by taking a leadership position in reducing the use of hazardous substances in its products and implementing an aggressive recycling program. Actel's commitment to protecting the environment is shown through the following objectives:

- **Compliance with all applicable regulatory requirements**
- **Reducing or eliminating the use of hazardous substances in our products and manufacturing operations**
- **Continuing to improve processes for recycling, waste reduction, and the elimination of ozone-depleting materials**
- **Complying with the European directive Reduction of Hazardous Substances (RoHS)**

Lead-Free

The move toward lead-free packaging has many complex problems and risks that the electronic industry needs to address. There are costs and risks associated with material development, testing, and manufacturing. As new processes and methods become available, suppliers and customers will need to upgrade their equipment, material, and processes.

As a good corporate and global citizen, Actel now offers all its plastic packages as lead free options and has been shipping "green" devices to customers since late 2002. These devices are identified from components containing lead by an "X79" suffix. Actel's lead-free packages offer the same high quality and reliability benefits as devices containing lead. For ease of manufacturing, lead-free Actel products have the same moisture sensitivity levels as equivalent components containing lead. Studies have showing that the effects of vibration on lead-free packages are no different than components with lead.

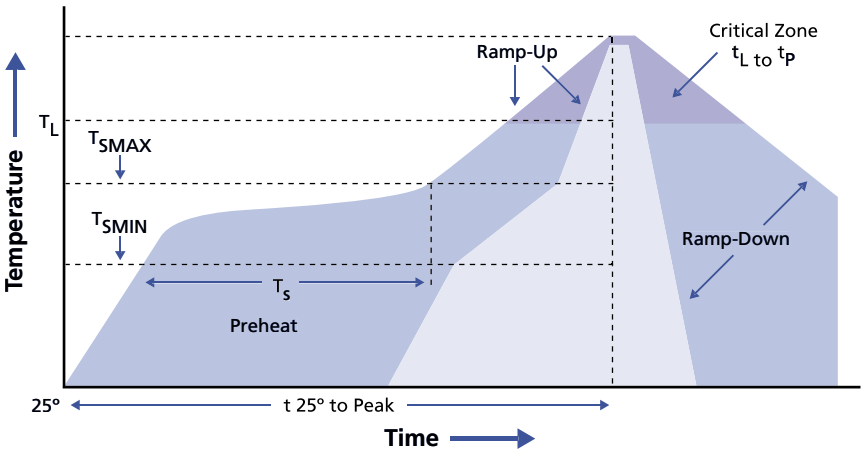
Package Type	Composition
PLCC, PQFP, VQFP, TQFP, RQFP	100% SN (Pure tin)
BGA, FBGA, CSP	95.5%SN/4.0%AG/0.5%CU

Halogen-Free

Halogen-free packages are free of all halogenated compounds such as bromine (Br), chlorine (Cl), antimony oxides, and dioxins. These compounds are commonly used as flame-retardants in the mold resin. Actel has qualified an environmentally friendly "green" mold compound for all plastic leaded packages that maintains the same safety characteristics. These halogen free devices can also be ordered using the "X79" suffix.

Green Packaging

Actel defines its green packaging as being free of lead, halogenated compounds, and antimony oxides. These devices offer all the same benefits and features found in the company's standard packaging options, such as high security, low-power consumption, and firm-error immunity.



Solder Reflow Profile for Lead-Free Packaging

Prohibitive Substances

- 1,1,1-Trichloroethane
- Alkylation Mercury Compound
- Antimony
- Antimony Compound
- Arsenic
- Arsenic Compound
- Asbestos
- Barium
- Beryllium or Beryllium Compound
- Cadmium or Cadmium Compound
- Carbon Tetrachloride
- CFC (s)
- CFC Compounds
- Cobalt or Cobalt Compound
- Co-planer Polychlorinated Biphenyl(Co-PCBs)
- Cynida Compound
- Diethylamine or Dimetylamine
- Dioxin
- Ethylen Glycol Ether or Lead Acetate
- Formaldehyde
- Halogenide Dibenzofran
- Halogennide Aromatic Hydrocarbon
- Halon (s)
- Halon Compounds
- Hexavalent Chromium or Compound
- Hydrazine
- Lead or Lead Compound
- Mercury or Mercury Compound
- Metal Carbonyl
- Monomethyl-Dibromo-diphenyl Methane (DBBT)
- N,N-Dimethylacetamide or N-Methylacetamide
- N,N-Dimethylformamide or N-Methylformamide
- Nitrosoamido or Nitrosamine
- Organophosphorus Compound
- Organotin Compound
- PBB Poly Brominated Biphenyl
- PBBE Poly Brominated Biphenyl Ether
- PBBO Polybrominated Biphenyl Oxide
- PBDE Polybrominated Diphenyl Ethers
- PCB Poly Chloro Biphenyl
- PCP Penta Chloro Phenol
- PCT Poly Chloro Triphenyl
- Phenol (Monomer)
- Phthalic acid Chloride Hydrocarbon
- Picric Acid
- Polychlorinated Dibenzo Furan
- Polychlorinated Dibenzo-Para-Dioxin
- Polychlorinated Naphthalene
- Polycyclic Aromatic Hydrocarbon
- PVC or PVC Compound
- Selemium or Selemium Compound
- Silver
- Tellunium or Tellunium Compound
- Thallium or Thallium Compound
- Vinyl Chloride Monomer

Actel's Recycling Program

In addition to providing environmentally friendly products, Actel has implemented an aggressive recycling program. Actel recycles and reclaims 100% of products that contain hazardous materials, so no harmful materials are put in land fills.

Whenever possible Actel also recycles packaging materials, such as wafer boats, tubes, trays, bubble wrap, and polystyrene. Actel recommends the use of Eco-foam, which is a starch-based, bio-degradable, repulpable packaging material that can be utilized as loose fill to protect goods during transit. Eco-foam should be re-used whenever possible and is not harmful to the environment if discarded.

For more information regarding **Actel's Green Packaging**, please contact your local **Actel** sales representative.

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